

Appn No. 09/976,511

Amdt date October 10, 2003

Reply to Office action of July 10, 2003

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Canceled).

2. (Currently Amended) ~~[The loss of signal circuit of claim 1 wherein]~~ A loss of signal circuit in an opto-electronic receiver, the opto-electronic receiver having a transimpedance amplifier AC coupled to a photodetector, the loss of signal circuit comprising:

a current to voltage circuit DC coupled to the photodetector, the current to voltage circuit [comprises] comprising a current mirror receiving a  $\Delta$  DC current signal generated by the photodetector and providing an intermediate DC voltage signal; and

a comparator coupled to the current to voltage circuit, the comparator receiving the intermediate DC voltage signal and providing a loss of signal signal.

3. (Original) The loss of signal circuit of claim 2 wherein current mirror includes transistors, and at least some of the transistors receive a substrate drive signal.

4. (Original) The loss of signal circuit of claim 3 wherein the substrate drive signal is provided by a process and temperature sensor.

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5. (Previously Presented) A loss of signal circuit in an opto-electronic receiver, the opto-electronic receiver having a transimpedance amplifier ac coupled to a photodetector, the loss of signal circuit comprising:

a current to voltage circuit dc coupled to the photodetector, the current to voltage circuit receiving a dc current signal generated by the photodetector and providing a dc voltage signal, the current to voltage circuit comprising a current mirror receiving the dc current signal and providing an intermediate dc voltage signal, the current mirror including transistors, and at least some of the transistors receive a substrate drive signal provided by a process and temperature sensor, the process and temperature sensor comprising a resistor and a transistor, the resistor coupled to the drain of the transistor and the substrate drive signal being formed at the drain of the transistor; and

a comparator coupled to the current to voltage circuit, the comparator receiving the dc voltage signal and providing a loss of signal signal.

6. (Original) The loss of signal circuit of claim 5 wherein the current mirror is a cascoded current mirror.

7. (Original) The loss of signal circuit of claim 6 further comprising sub-threshold current compensator transistor coupled to the current mirror.

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8. (Canceled)

9. (Canceled)

10. (Canceled)

11. (Canceled)

12. (Previously Presented) An apparatus for generating a Loss Of Signal (LOS) signal for a photodetector circuit included in an opto-electronic receiver, the photodetector circuit being AC coupled to an amplifier stage included in the opto-electronic receiver, the photodetector circuit generating a DC signal responsive to an optical signal, the apparatus comprising:

a current to voltage converter circuit receiving the DC signal from the photodetector circuit, the current to voltage converter circuit generating a voltage signal in response to the DC signal, the current to voltage converter comprising:

a current mirror circuit receiving the DC signal, the current mirror circuit generating an intermediate current signal in response to the DC signal;

a load resistor operably coupled to the current mirror circuit, the intermediate current signal flowing through the load resistor generating an intermediate voltage signal; and

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a voltage buffer circuit receiving the intermediate voltage signal, the voltage buffer circuit generating the voltage signal; and  
a comparator circuit receiving the voltage signal from the current to voltage converter circuit, the comparator circuit generating a LOS signal in response to the voltage signal.

13. (Original) The apparatus of claim 12, wherein the current to voltage converter circuit further includes a process and temperature sensor circuit generating a temperature and process compensation signal received by the current mirror circuit.

14. (Currently Amended) ~~[The apparatus of claim 11, further]~~ An apparatus for generating a Loss Of Signal (LOS) signal for a photodetector circuit included in an opto-electronic receiver, the photodetector circuit being AC coupled to an amplifier stage included in the opto-electronic receiver, the photodetector circuit generating a DC signal responsive to an optical signal, the apparatus comprising:

a current to voltage converter circuit receiving the DC signal from the photodetector circuit, the current to voltage converter circuit generating a voltage signal in response to the DC signal;

a comparator circuit receiving the voltage signal from the current to voltage converter circuit, the comparator

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circuit generating a LOS signal in response to the voltage signal; and

a translator circuit receiving the LOS signal from the comparator circuit, the translator circuit generating an adjusted LOS signal from the LOS signal.

15. (Currently Amended) [The apparatus of claim 11] An apparatus for generating a Loss Of Signal (LOS) signal for a photodetector circuit included in an opto-electronic receiver, the photodetector circuit being AC coupled to an amplifier stage included in the opto-electronic receiver, the photodetector circuit generating a DC signal responsive to an optical signal, the apparatus comprising:

a current to voltage converter circuit receiving the DC signal from the photodetector circuit, the current to voltage converter circuit generating a voltage signal in response to the DC signal; and

a comparator circuit receiving the voltage signal from the current to voltage converter circuit, the comparator circuit generating a LOS signal in response to the voltage signal, the comparator circuit [further] including:

a reference voltage generator circuit, the reference voltage generator circuit generating a reference voltage signal; and

a comparison stage receiving the reference voltage signal and the voltage signal, the comparison stage generating the LOS signal by comparing the voltage signal to the reference voltage signal.

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16. (Canceled).

17. (Previously Presented) A method for generating a Loss Of Signal (LOS) signal for a photodetector circuit included in an opto-electronic receiver, the photodetector circuit AC coupled to an amplifier stage included in the opto-electronic receiver, the photodetector circuit generating a DC signal responsive to an optical signal, the method comprising:

providing a current to voltage converter circuit operably coupled to the photodetector circuit, the current to voltage converter circuit comprising a current mirror circuit operably coupled to a load resistor and a voltage buffer circuit;

providing a comparator circuit operably coupled to the voltage buffer circuit of the current to voltage converter circuit;

receiving by the current mirror circuit of the current to voltage converter circuit from the photodetector circuit the DC signal;

generating by the current mirror circuit an intermediate current signal in response to the DC signal;

generating an intermediate voltage signal by flowing the intermediate current signal through the load resistor;

receiving by the voltage buffer circuit the intermediate voltage signal;

generating by the voltage buffer circuit a voltage signal;

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receiving by the comparator circuit from the voltage buffer circuit the voltage signal; and

generating by the comparator circuit from the voltage signal a LOS signal.

18. (Original) The method of claim 17, wherein the current to voltage converter circuit further includes a process and temperature sensor circuit, the method further comprising:

generating by the process and temperature sensor circuit a temperature and process compensation signal;

receiving by the current mirror circuit the temperature and process compensation signal; and

generating by the current mirror circuit the voltage signal using the temperature and process compensation signal and the current signal.

19. (Currently Amended) [The method of claim 16, further]  
A method for generating a Loss Of Signal (LOS) signal for a photodetector circuit included in an opto-electronic receiver, the photodetector circuit AC coupled to an amplifier stage included in the opto-electronic receiver, the photodetector circuit generating a DC signal responsive to an optical signal,  
the method comprising:

providing a current to voltage converter circuit operably coupled to the photodetector circuit;

providing a comparator circuit operably coupled to the current to voltage converter circuit;

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providing a translator circuit operably coupled to the comparator circuit;

receiving by the current to voltage converter circuit from the photodetector circuit the DC signal;

generating by the current to voltage converter circuit a voltage signal in response to the DC signal;

receiving by the comparator circuit from the current to voltage converter circuit the voltage signal;

generating by the comparator circuit from the voltage signal a LOS signal; and

receiving by the translator circuit the LOS signal from the comparator circuit, the translator circuit generating an adjusted LOS signal from the LOS signal.

20. (Currently Amended) [The method of claim 16, further comprising:] A method for generating a Loss Of Signal (LOS) signal for a photodetector circuit included in an opto-electronic receiver, the photodetector circuit AC coupled to an amplifier stage included in the opto-electronic receiver, the photodetector circuit generating a DC signal responsive to an optical signal, the method comprising:

providing a current to voltage converter circuit operably coupled to the photodetector circuit;

providing a comparator circuit operably coupled to the current to voltage converter circuit, the comparator circuit including, a reference voltage generator circuit and a comparison stage operably coupled to the reference

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voltage generator circuit [~~included in the comparator circuit, the method further comprising~~];

receiving by the current to voltage converter circuit from the photodetector circuit the DC signal;

generating by the current to voltage converter circuit a voltage signal in response to the DC signal;

generating by the reference voltage generator circuit a reference voltage signal;

receiving by the comparison stage the reference voltage signal;

receiving by the comparison stage from the current to voltage converter circuit the voltage signal; and

generating by the comparison stage the LOS signal by comparing the voltage signal to the reference voltage signal.

21. (Canceled).

22. (Previously Presented) An apparatus for generating a Loss Of Signal (LOS) signal for a photodetector circuit included in an opto-electronic receiver, the photodetector circuit AC coupled to an amplifier stage included in the opto-electronic receiver, the photodetector circuit generating a DC signal responsive to an optical signal, the apparatus comprising

current to voltage converter means operably coupled to the photodetector circuit for generating a voltage signal in response to the DC signal, comprising:

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current mirror means for generating an intermediate current signal in response to the DC signal;

resistor means operably coupled to the current mirror means for generating an intermediate voltage signal in response to the intermediate current signal; and

voltage buffer means operably coupled to the resistor means for generating a voltage signal from the intermediate voltage signal; and

comparator means operably coupled to the current to voltage converter means for generating a LOS signal in response to the voltage signal.

23. (Currently Amended) [The apparatus of claim 21, wherein] An apparatus for generating a Loss Of Signal (LOS) signal for a photodetector circuit included in an opto-electronic receiver, the photodetector circuit AC coupled to an amplifier stage included in the opto-electronic receiver, the photodetector circuit generating a DC signal responsive to an optical signal, the apparatus comprising:

current to voltage converter means operably coupled to the photodetector circuit for generating a voltage signal in response to the DC signal, the current to voltage converter means further [includes] including a process and temperature sensor means operably coupled to [the] a current mirror means for generating a temperature and process compensation signal received by the current mirror means; and

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comparator means operably coupled to the current to voltage converter means for generating a LOS signal in response to the voltage signal.

24. (Currently Amended) [The apparatus of claim 21, further] An apparatus for generating a Loss Of Signal (LOS) signal for a photodetector circuit included in an opto-electronic receiver, the photodetector circuit AC coupled to an amplifier stage included in the opto-electronic receiver, the photodetector circuit generating a DC signal responsive to an optical signal, the apparatus comprising:

current to voltage converter means operably coupled to the photodetector circuit for generating a voltage signal in response to the DC signal;

comparator means operably coupled to the current to voltage converter means for generating a LOS signal in response to the voltage signal; and

translator means operably coupled to the comparator means for generating an adjusted LOS signal from the LOS signal.

25. (Currently Amended) [The apparatus of claim 21, the comparator means further] An apparatus for generating a Loss Of Signal (LOS) signal for a photodetector circuit included in an opto-electronic receiver, the photodetector circuit AC coupled to an amplifier stage included in the opto-electronic receiver, the photodetector circuit generating a DC signal responsive to an optical signal, the apparatus comprising:

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current to voltage converter means operably coupled to the photodetector circuit for generating a voltage signal in response to the DC signal; and

comparator means operably coupled to the current to voltage converter means for generating a LOS signal in response to the voltage signal, the comparator means including:

reference voltage generator means for generating a reference voltage signal; and

comparison means operably coupled to the reference voltage generator means for comparing the voltage signal to the reference voltage signal.